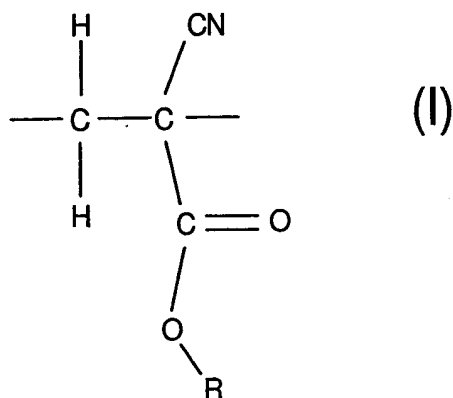


Claims

What is claimed is:

- 1 1. A resist composition comprising (a) an imaging polymer, and (b) a
2 radiation sensitive acid generator, said imaging polymer comprising
3 cyano-modified acrylic monomer units comprising an acrylic moiety with a
4 cyano group pendant therefrom.
- 1 2. The composition of claim 1 wherein said imaging polymer contains cyclic
2 olefin monomeric units in a backbone portion of said polymer, and/or (ii)
3 alicyclic moieties as bulky end groups pendant to said cyano-modified
4 acrylic monomer units.
- 1 3. The composition of claim 1 wherein said acrylic moiety is selected from the
2 group consisting of acrylic acids and acrylates.
- 1 4. The composition of claim 1 wherein said 2-cyano acrylic monomer
2 has a structure:



3 where R is H or COO-R is an ester group.

- 1 5. The composition of claim 4 wherein R contains at least one moiety selected
2 from the group consisting of (a) an acid-labile moiety which inhibits
3 solubility of said composition in aqueous alkaline solutions, (b) a polar
4 moiety which promotes the solubility of said composition in aqueous
5 alkaline solutions, and (c) a non-acid-labile, non-polar moiety.
- 1 6. The composition of claim 5 wherein R comprises an acid-labile moiety
2 selected from the group consisting of tertiary alkyl (or cycloalkyl) esters,
3 ketals, and acetals.
- 1 7. The composition of claim 6 wherein said acid-labile moiety is an ester form
2 of an alkyl selected from the group consisting of t-butyl, methyl cyclopentyl,
3 methyl cyclohexyl, and methyl adamantyl.
- 1 8. The composition of claim 5 wherein R comprises a polar moiety selected
2 from the group consisting of carboxylic acids, lactones, amides, imides,
3 sulfonamides, and fluoroalcohols such as $-\text{CH}(\text{CF}_3)\text{OH}$ and $-\text{C}(\text{CF}_3)_2\text{OH}$.
- 1 9. The composition of claim 5 wherein R comprises a non-polar, non-acid
2 labile moiety selected from the group consisting of primary and secondary
3 linear, branched and cyclic alkyls, and aryls.
- 1 10. The composition of claim 9 wherein said alkyls and aryls contain 1-12
2 carbon atoms.
- 1 11. The composition of claim 1 wherein said imaging polymer further comprises
2 having at least one monomeric unit selected from the group consisting of
3 (a) cyclic olefin monomeric units containing acid labile moieties which
4 inhibit the solubility of the resist in aqueous alkaline solutions, (b) cyclic

5 olefin monomeric units containing polar moieties which promote solubility of
6 said resist in aqueous alkaline solutions, (c) cyclic olefin monomeric units
7 containing pendant lactone moieties, (d) cyclic olefin monomeric units
8 containing no pendant moieties or pendant moieties which are non-polar
9 and non-acid labile, (e) non-cyclic olefin monomeric units capable of
10 undergoing free-radical copolymerization with said cyano-modified acrylic
11 monomeric units, and (f) other monomeric units that are compatible with the
12 function of the polymer as component of the resist.

1 12. The composition of claim 11 wherein said imaging polymer comprises (a)
2 cyclic olefin monomeric units containing acid labile moieties which inhibit
3 the solubility of the resist in aqueous alkaline solutions.

1 13. The composition of claim 11 wherein said imaging polymer comprises (b)
2 cyclic olefin monomeric units containing polar moieties which promote
3 solubility of said resist in aqueous alkaline solutions.

1 14. The composition of claim 11 wherein said imaging polymer comprises (c)
2 cyclic olefin monomeric units containing pendant lactone moieties.

1 15. The composition of claim 1 wherein said imaging polymer contains at least
2 about 20 mole % of cyano-modified acrylic monomeric units.

1 16. The composition of claim 1 wherein said resist composition contains at
2 least about 0.5 wt.% of said radiation sensitive acid generator based on the
3 weight of said imaging polymer.

- 1 17. A method of forming a patterned material structure on a substrate, said
2 material being selected from the group consisting of semiconductors,
3 ceramics and metals, said method comprising:
- 4 (A) providing a substrate with a layer of said material,
- 5 (B) applying a resist composition to said substrate to form a resist layer
6 on said substrate, said resist composition comprising (a) an imaging
7 polymer, and (b) a radiation sensitive acid generator, said imaging
8 polymer comprising cyano-modified acrylic monomer units
9 comprising an acrylic moiety with a cyano group pendant therefrom;
- 10 (C) patternwise exposing said substrate to radiation whereby acid is
11 generated by said acid generator in exposed regions of said resist
12 layer by said radiation,
- 13 (D) contacting said substrate with an aqueous alkaline developer
14 solution, whereby said exposed regions of said resist layer are
15 selectively dissolved by said developer solution to reveal a patterned
16 resist structure, and
- 17 (E) transferring resist structure pattern to said material layer, by etching
18 into said material layer through spaces in said resist structure
19 pattern.
- 1 18. The method of claim 17 wherein said material is metal.
- 1 19. The method of claim 17 wherein said etching comprises reactive ion
2 etching.

- 1 20. The method of claim 17 wherein at least one intermediate layer is provided
2 between said material layer and said resist layer, and step (E) comprises
3 etching through said intermediate layer.
- 1 21. The method of claim 17 wherein said radiation has a wavelength of about
2 193 nm.
- 1 22. The method of claim 17 wherein said substrate is baked between steps (C)
2 and (D).
- 1 23. The method of claim 17 wherein said imaging polymer contains cyclic olefin
2 monomeric units in a backbone portion of said polymer, and/or (ii) alicyclic
3 moieties as bulky end groups.